Natural Capital, Equity and Climate Change

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Equity

- Two dimensions
  - Inter- and Intra-Generational
- Inter-generational equity bound up with pure rate of time preference delta
- Both affected by elasticity of MU, eta
- We express equity judgments of both types when we choose delta and eta

Equity

- Famous Ramsey equation for consumption discount rate ties together both:

$$\rho_t = \delta + \eta(c_t) R(c_t)$$

- CDR depends on intergenerational equity values via delta and intragenerational via eta

Equity

- As eta rises, MU of cons'n falls faster. If cons'n grows then MU of future generations falls more rapidly
- Less concerned about benefits to future.
- Consumption discount rate is higher – place less value on stopping climate change. So *a stronger preference for equality leads to less action on climate change*.

Equity

- Offsetting effect, not visible in aggregative model
- Climate change an external effect imposed by rich countries on poor.
  - greenhouse gases currently in atmosphere were put there by the rich countries,
  - and the biggest losers will be the poor countries
- Because of this, *a stronger preference for equality will make us more concerned to take action on climate change*.

Natural Capital

- Affects well-being in many ways, depending on stage of development
- Poor countries heavily dependent on services of natural capital
- Natural capital compromised by climate change

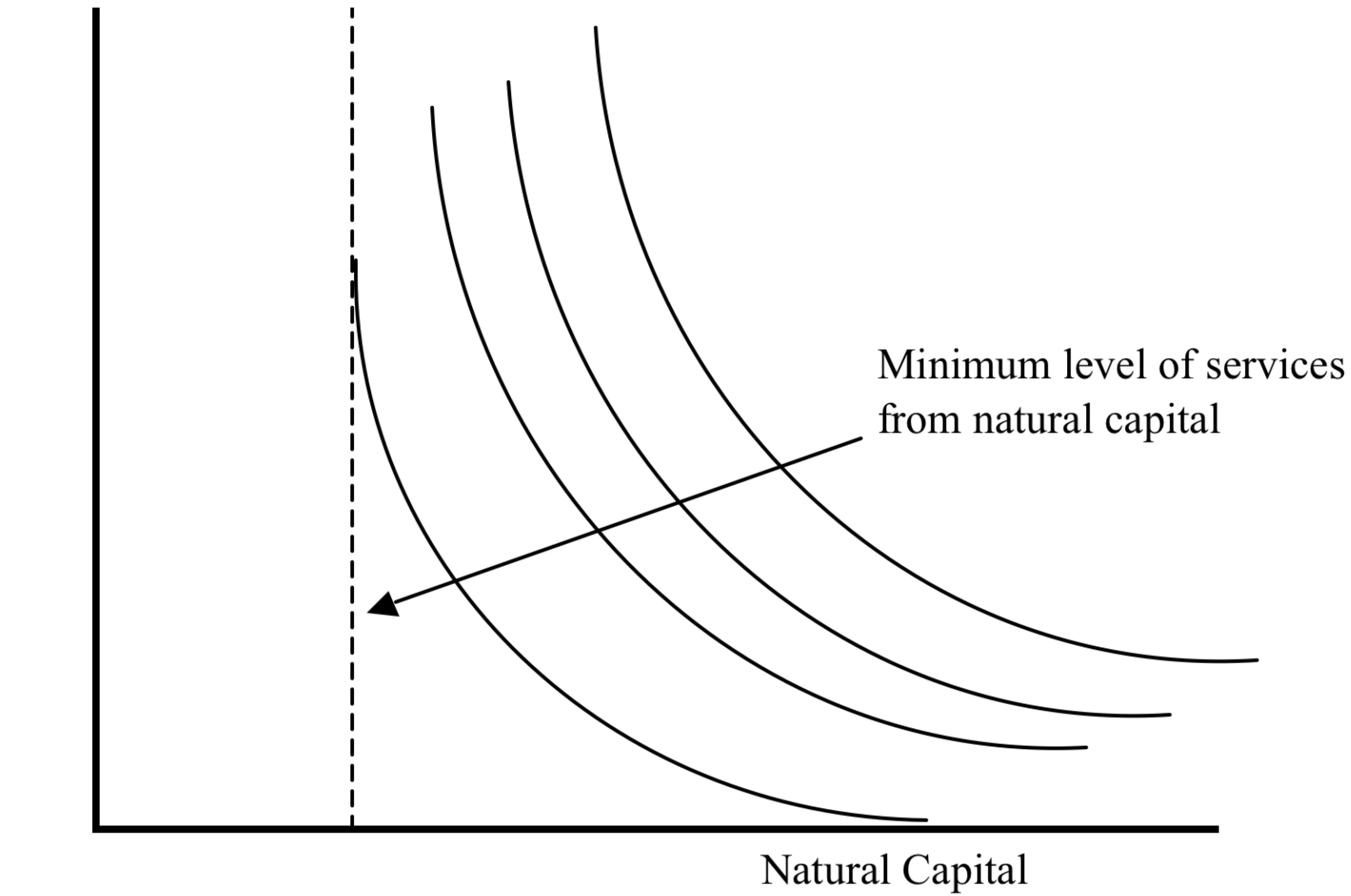
Natural Capital

$$c_t = \left(c_{1,t}, c_{2,t}, \ldots c_{n,t}\right)$$

- Ramsey equation is now

$$\rho_{i,t} = \delta + \eta_{ii}\left(c_t\right) R\left(c_{i,t}\right) + \sum_{j \neq i} \eta_{ij}\left(c_t\right) R\left(c_{j,t}\right)$$

- CDR is good-specific and can be + or -



$$\left[\alpha c^{\sigma} + (1-\alpha)(s-\varepsilon)^{\sigma}\right]^{\frac{1}{\sigma}}$$

Natural Capital

- For $\sigma > 1,$ every indifference curve, every welfare level, can be attained with only ε of ecosystem services, whereas with $\sigma < 1$ greater welfare levels require greater levels of ecosystem services (and of consumption goods).

Sterner and Persson

$$\left[(1-\gamma)c^{1-1/\sigma}+\gamma s^{1-1/\sigma}\right]^{(1-\alpha)\sigma/(1-\sigma)}/(1-\alpha)$$

- Run DICE with this objective – makes a huge difference to the outcomes

Intra-generational Equity

$$\rho_{i,t} = \delta + \eta_{ii}(c_t) R(c_{i,t}) + \sum_{j \neq i} \eta_{ij}(c_t) R(c_{j,t})$$

- Can take subscripts here to be social groups not goods

Role of Eta

- Plays several roles
  - Affects intergenerational choices via Ramsey equn, with larger value making for less concern for CC
  - Affects intragenerational choices directly, with larger values making for more concern for CC
  - Affects risk aversion
- Really need to find a formulation that separates these roles

Disaggregation

- Need models that distinguish environmental services from manufactured goods, and
- Need models that distinguish rich groups from poor
- Two dimensions of disaggregation